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Research on neutron instrument streaming data processing at CSNS

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In this study, we first conducted in-depth research on the reading and processing methods for streaming data applicable to neutron spectrometer experiments, based on the experimental methods and data processing requirements of neutron spectrometers and the data flow characteristics of distributed streaming data transmission platforms. We designed and implemented a general neutron spectrometer data stream reading and processing framework (NSDRP) to solve various problems encountered by the streaming data transmission platform in the application of neutron spectrometer experiments.100K messages of each Kafka topic are tested with NISDRP, the data reading and processing speed of NISDRP can reach 1000+Hz, which far exceeds the most Spallation Neutron Source.The NISDRP supports multiple types of data sources and can perform real-time processing and conversion of data streams. Additionally, we implemented a web-based user interface to facilitate experiment data processing and analysis, improving the efficiency and convenience of data processing. Finally, we used the framework to process and analyze experimental data, and compared and evaluated it with traditional file-based data processing methods. The results show that the framework significantly improves the processing efficiency and reliability of neutron spectrometer experimental data. This research outcome has important implications for data processing and application in neutron spectrometer experiments and related fields.

Footnotes

Funding Agency

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Yes

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